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Geological Society of Kentucky
Chester Field Excursion

ITINERARY

Outcrop of the Chester Formations of
Crawford and Perry Counties, Indiana
and Breckinridge County, Kentucky.

ITINERARY PREPARED IN COOPERATION WITH
KENTUCKY GEOLOGICAL SURVEY

Compiled By
Preston McGrae

APRIL, 1952

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GEOLOGICAL SOCIETY OF KENTUCKY
CHESTER FIELD EXCURSION

ITINERARY

Outcrop of the Chester Formations of
Crawford and Perry Counties, Indiana,
and Breckinridge County, Kentucky

April 25 and 26, 1952

Sponsored by

GEOLOGICAL SOCIETY OF KENTUCKY

J. W. Huddle, President
W. D. Chawner, Vice-President (Western Region)
R. N. Thomas, Vice-President (Eastern Region)
J. E. Johnston, Secretary-Treasurer

Compiled by

Preston McGrain

Lexington, Kentucky

April, 1952

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SUMMARY OF PROGRAM

Headquarters for the Spring Meeting of the Geological Society of Kentucky is the Owensboro Hotel, Owensboro, Kentucky. Members and guests are requested to register and obtain their guide books on Thursday evening, April 24.

The itinerary, as planned and shown on the accompanying route map, is divided into two parts. Friday morning, April 25, at 8:00 (Central Standard Time) the group will leave for an all-day excursion in Perry and Crawford Counties, Indiana. A lunch stop will be made at Wyandotte Lodge. Members planning to attend this portion of the meeting should notify the Secretary of the Society in order that luncheon reservations may be made.

On Friday evening at 7:00 p.m. a banquet and business meeting will be held at Gabe's Steak House in Owensboro. Advance reservations should be made with the Secretary.

At 8:00 (Central Standard Time) Saturday morning the party leaves Owensboro for Stop 6 of the itinerary. The field excursion will end at Stop 8, near Irvington, Kentucky. Those not planning to return to Owensboro after this stop should check out of their respective hotels Saturday morning.

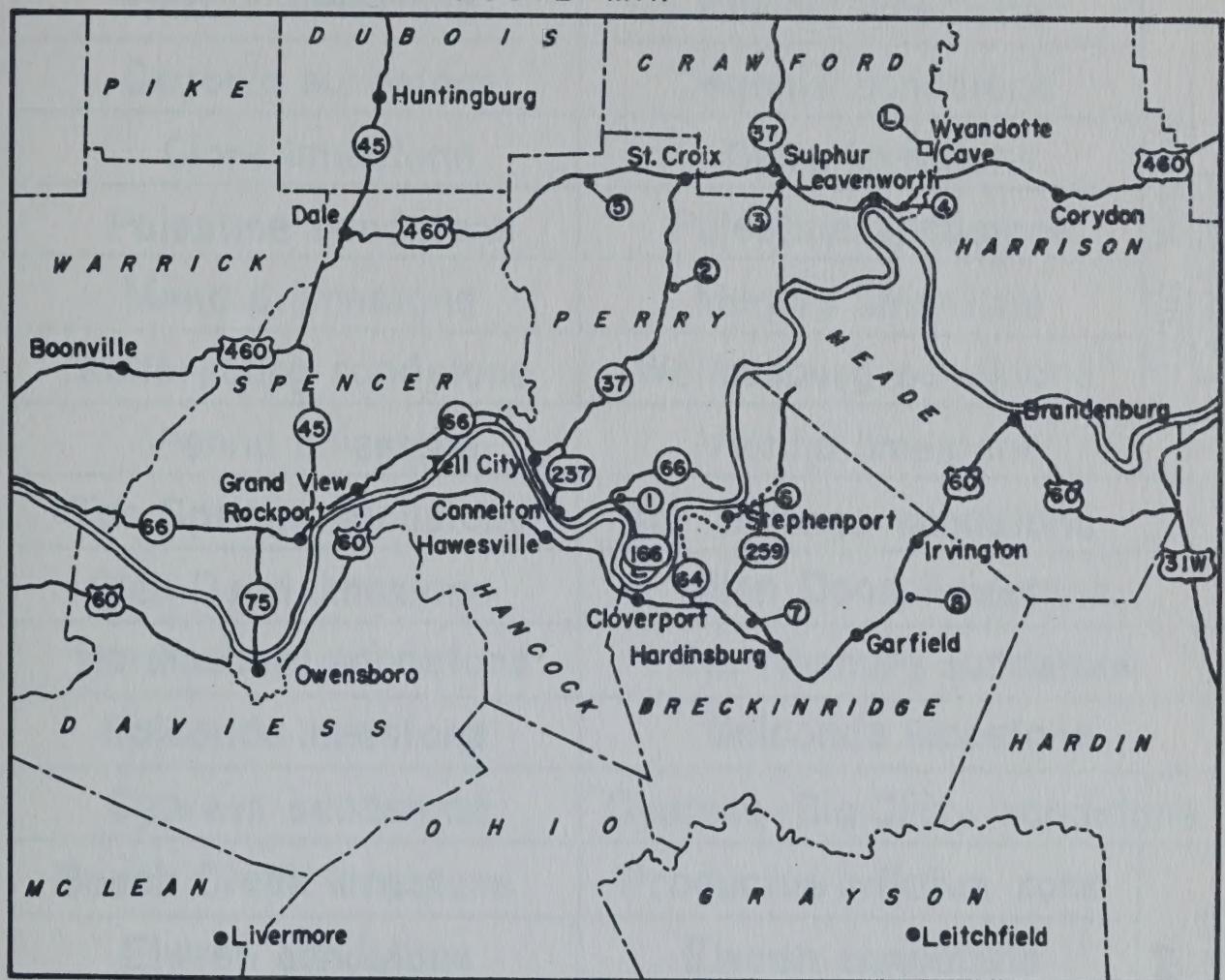
INTRODUCTION

The outcrop stratigraphy of the Chester formations of the Eastern Interior Basin has been of special interest to geologists because of its economic importance to the petroleum industry of this area. Numerous formal and informal field excursions have been conducted for the sole purpose of studying this series of rock formations. The Geological Society of Kentucky conducted a trip over the Chester outcrop of western Kentucky in 1940 but did not visit the area covered by the present excursion. The same year the Indiana-Kentucky Geological Society held a similar excursion in the outcrop area of the Chester series of southern Indiana. The Second Annual Indiana Geologic Field Conference sponsored by the Department of Geology, Indiana University, and the Division of Geology, Indiana Department of Conservation, in 1948, included a study of these same Upper Mississippian formations of southern Indiana.

The present itinerary (fig. 1) includes some of the same sites which were visited on the Indiana tours. They are repeated here because the succession of formations are well exposed, typically developed, and readily accessible. Chester outcrops of both southern Indiana and northwestern Kentucky are incorporated in this field excursion primarily for the purpose of showing the relationship between the two areas (fig. 2).

The writer gratefully acknowledges the helpful suggestions of A. C. McFarlan, W. W. Hagan, and R. E. Stouder in planning the field excursion. T. A. Dawson, Head, Petroleum Section, Indiana Geological Survey, provided data about oil fields located along the trip route. Frank H. Walker assisted in measuring some of the sections and preparing the trip log. Acknowledgement is also made of the work of the late Dr. C. A. Malott, who, over a period of several years, made many detailed investigations of Chester stratigraphy and conducted numerous field excursions over the area under consideration.

ROUTE MAP



SCHEDULED STOPS • ③

Scale
0 5 10 20 MILES

Figure 1

CORRELATION OF OUTCROP NOMENCLATURE

SOUTHERN INDIANA	WESTERN KENTUCKY
Mansfield sandstone	Caseyville sandstone
Kinkaid limestone	Kinkaid limestone
Degonia sandstone	Degonia sandstone
Clore limestone	Clore limestone
Palestine sandstone	Palestine sandstone
Menard limestone	Menard limestone
Waltersburg sandstone	Waltersburg sandstone
Vienna limestone	Vienna limestone
Tar Springs sandstone	Tar Springs sandstone
Glen Dean limestone	Glen Dean limestone
Hardinsburg sandstone	Hardinsburg sandstone
Golconda limestone	Golconda limestone
Cypress sandstone	Cypress=Big Clifty sandstone
Beech Creek limestone	Productus inflatus zone
Elwren sandstone	Elwren sandstone
Reelsville limestone	Reelsville limestone
Sample sandstone	Sample=Bethel sandstone
Beaver Bend limestone	Beaver Bend limestone
Mooretown sandstone	Mooretown sandstone
Paoli limestone	Unnamed limestone
Aux Vases sandstone	(Not recognized in Ky.)
Ste. Genevieve limestone	Ste. Genevieve limestone

Buffalo Wallow
Leitchfield

Paint Creek

Renault

Figure 2

FIELD EXCURSION

Friday, April 25, 1952

Leave Owensboro at 8:00 a.m. (Central Standard Time). Cross Ohio River bridge and travel northward on Ind. Hwy. 75 for 9 miles to the junction with Ind. Hwy. 66. A very brief stop will be made at this point at 8:15 to assemble the convoy.

The Rockport field, located just south of this assembly point, produces from the Pennsylvanian, Palestine, Tar Springs, "Cypress", and Ste. Genevieve at depths of 650, 925, 1100, 1400, and 1575 feet respectively. The field was discovered in 1939.

Turn right (east) on Ind. Hwy. 66 and proceed 33.1 miles to the junction of Ind. Hwys. 66 and 166 and Stop 1. This route is along and near the Ohio River and passes through Rockport, Grandview, Troy, Tell City, and Cannelton.

The small Newtonville field is located a short distance north of Ind. Hwy. 66 about 4 miles northeast of Grandview. Production is from the Jackson at 775 feet. The Scout Association Production Report shows the discovery date to be 1943 but it is known that there were wells here prior to 1940.

The Troy field, located along Anderson River immediately north of the little refinery at Troy, produces from the Jackson, Bethel, and Ste. Genevieve at depths of around 600, 800, and 875 feet respectively. The discovery date is reported to be 1928.

Check speedometer at intersection of Ind. Hwys. 66 and 237 at edge of Cannelton. This city derives its name from the bed of cannel coal which is well developed in this area. Most of this coal has been mined out. Proceed on Ind. Hwy. 66 through Cannelton and on east out of town along the Ohio River.

The overhanging bluffs to the left of the highway east of Cannelton are Mansfield sandstone. Its abnormally low position is caused by faulting.

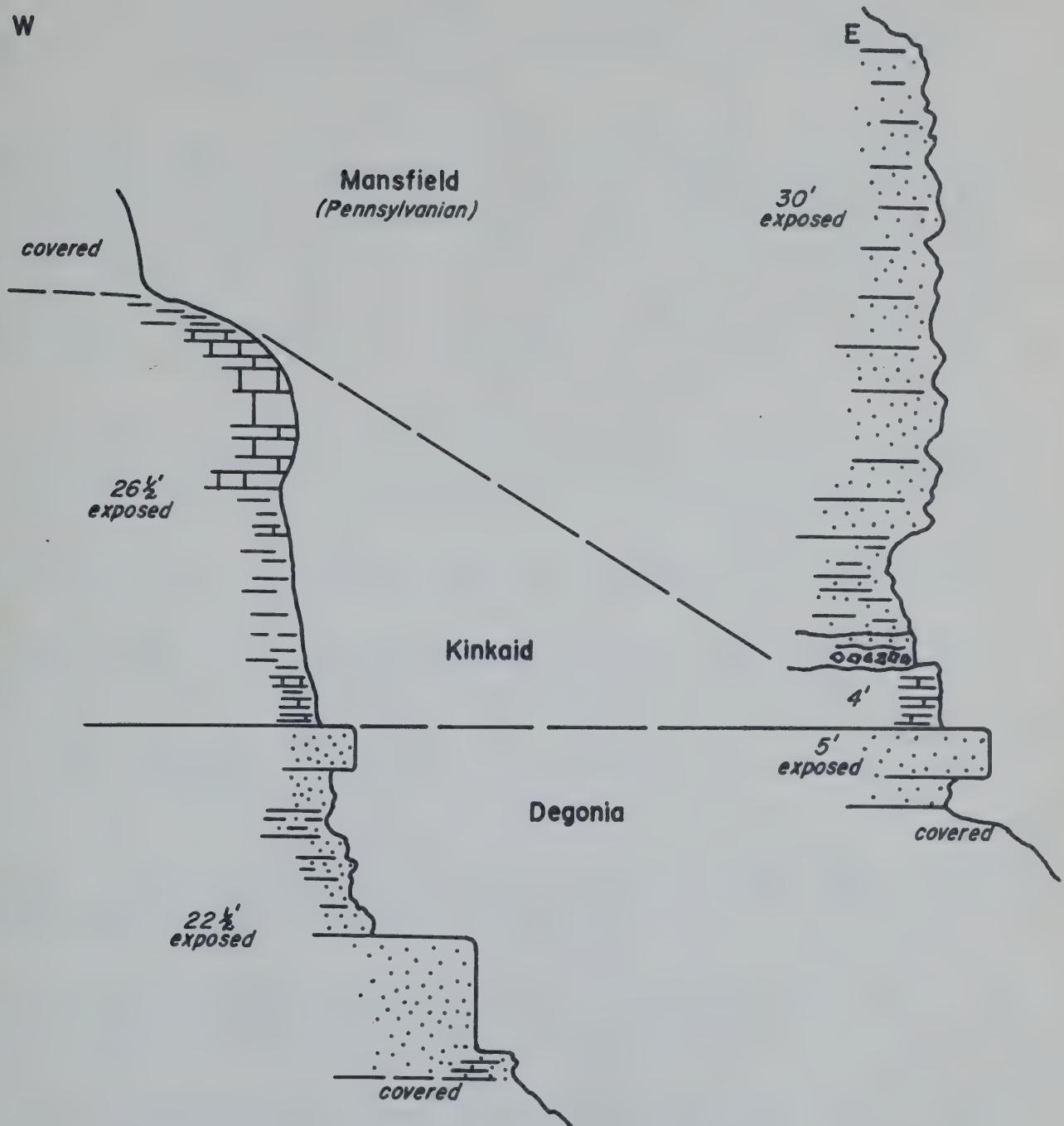
SLOW DOWN 3.7 miles from intersection of Ind. Hwys. 66 and 237. Lafayette Springs. Pebby, cross-bedded, massive Mansfield sandstone. Rock Island, located in the Ohio River immediately upstream from this point, is a huge boulder of Mansfield sandstone which has fallen into the river from the overhanging cliff.

Proceed eastward 1.5 miles to the intersection of Ind. Hwys. 66 and 166 for Stop 1.

STOP 1, Jones Hill (fig. 3). Section of Degonia sandstone and Kinkaid limestone. Huge blocks of hard, quartzitic Degonia sandstone have slumped and slid down the hill. Note the undulating bedding planes, Chaetetes, and Spirifer

STOP 1

JONES HILL, IND., SECTION
AT JUNCTION OF IND. HWYS. 66 AND 166
5.2 MILES EAST OF CANNELTON, PERRY COUNTY, INDIANA



Adapted from Malott et al (1948, Fig. 5)

Figure 3

increbescens in the Kinkaid. Along the hill to the east, the Mansfield sandstone (Pennsylvanian) cuts out most of the Kinkaid section. The contact is marked by a basal conglomerate and breccia.

Turn around. Return 5.2 miles to Cannelton and junction of Ind. Hwys. 66 and 237. Turn right (north) on Ind. Hwy. 237 to junction Ind. Hwy. 37.

Turn right (northeast) on Ind. Hwy. 37 and drive 13.1 miles northeast to road to Leopold and Stop 2. The coal workings seen to this point are in one of the thin coal seams in the Lower Pottsville.

STOP 2, Leopold Road Section (fig. 4). Upper Chester beds ranging from the Menard to the Kinkaid are intermittently exposed along the highway. Slump, soil, and vegetation largely cover the rocks along the highway but Malott's 1948 measured section is included to show the stratigraphic relationships which were once exposed here. Clore limestone and shales occur in the road cut at the junction of the Leopold road and Ind. Hwy. 37. Mansfield sandstone occupies a channel in the Chester beds at the north end of the section, resting below the level of the Kinkaid limestone. Other exposures of the Menard, Palestine, Clore, and Degonia may be viewed in the ravine east of the highway.

Drive northward on Ind. Hwy. 37 to the junction of Ind. Hwy. 37 and U. S. Hwy. 460 at St. Croix. Along this part of the route Mansfield sandstone caps the hills and ridges; Upper Chester formations are exposed in the valleys.

Turn right (east) on U. S. Hwy. 460 at St. Croix and check speedometer.

SLOW DOWN 1 mile east of St. Croix. Contact of soft, peculiarly iron-impregnated Mansfield sandstone with Chester (probably Menard) shale.

SLOW DOWN 1.6 miles east of St. Croix. Bluffs of massive Tar Springs sandstone on either side of the road.

SLOW DOWN at village of West Fork 3.8 miles east of St. Croix. Abandoned quarry on the right (south) is in the Golconda limestone. Thin and shaly bedded Hardinsburg sandstone is exposed above the Golconda.

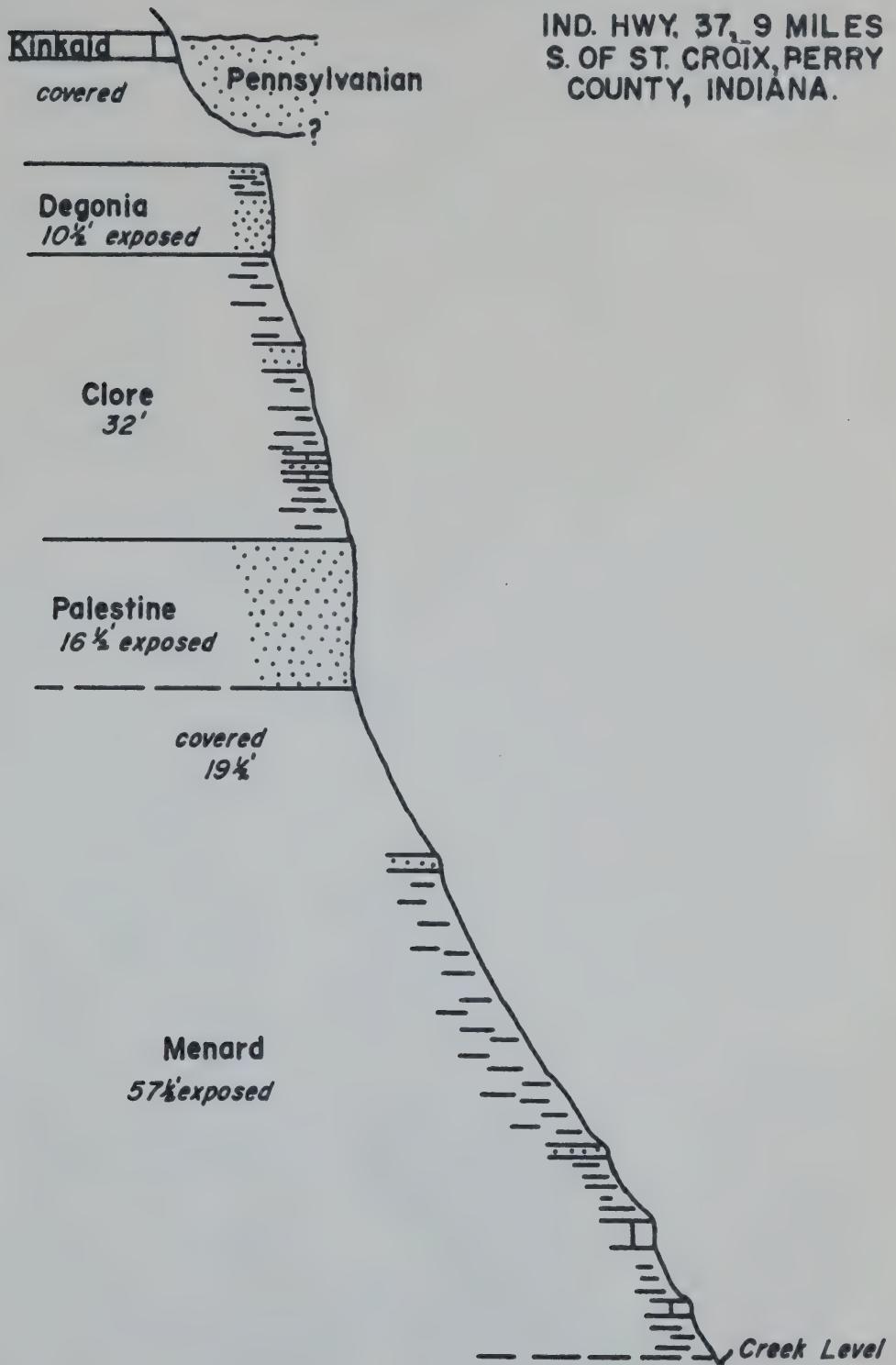
Continue eastward (8 miles east of St. Croix) to a point about three-fourths of a mile east of the village of Sulphur for Stop 3.

STOP 3, Sulphur Section (fig. 5). Eleven formations of the Chester series aggregating about 300 feet are exposed along U. S. Hwy. 460 on the west bluff of Little Blue River. This is one of the well known and frequently visited Chester sections of Indiana. The Tar Springs and Sample formations are largely shale at this locality but short distances away they are massive, cliff-forming sandstones. The sandstone above the thin Vienna limestone in the old road trace is

STOP 2

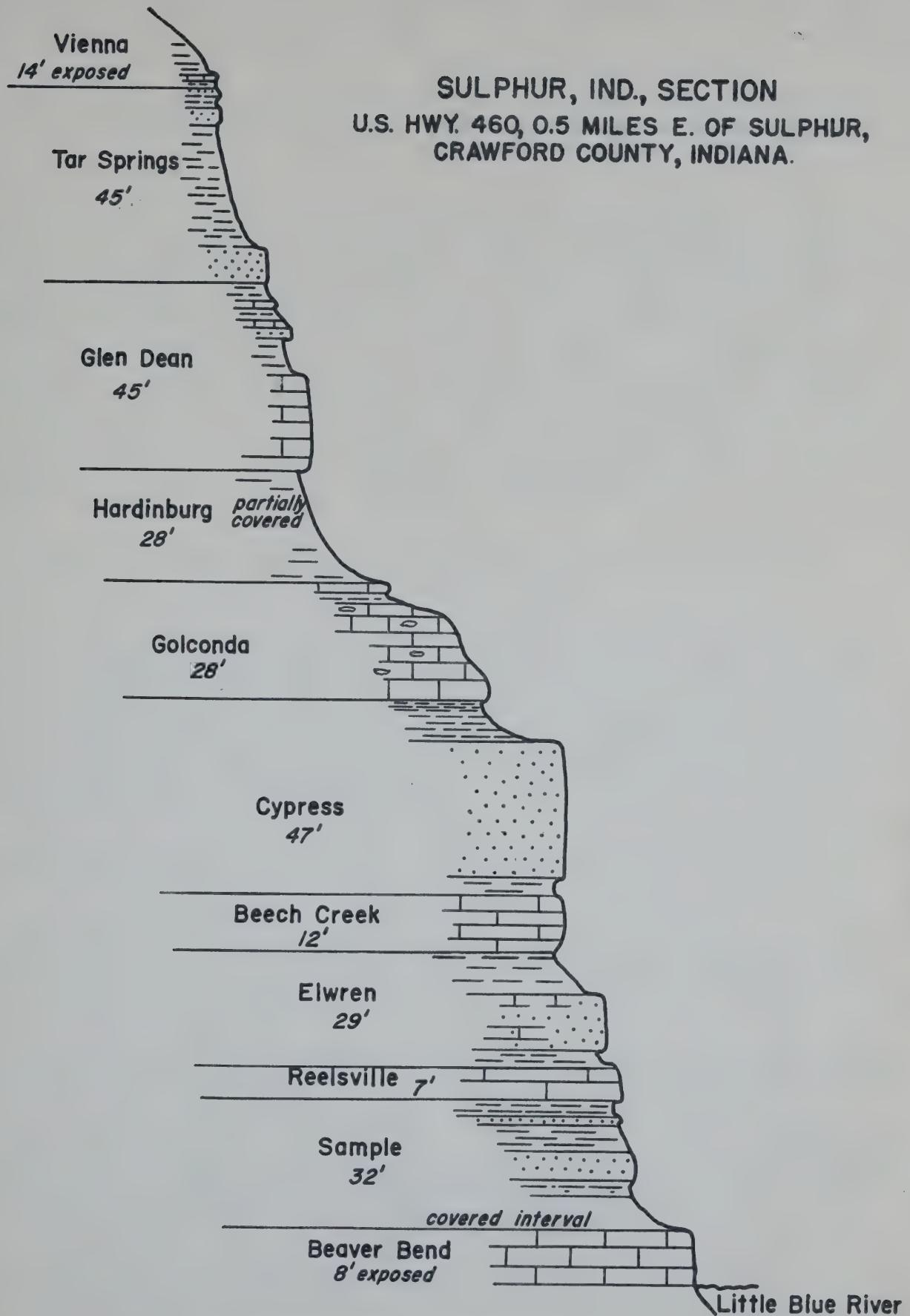
LEOPOLD ROAD, IND., SECTION

IND. HWY. 37, 9 MILES
S. OF ST. CROIX, PERRY
COUNTY, INDIANA.



After Malott et al (1948, Fig. 4.)
Figure 4

STOP 3



Adapted from Malott and Esarey (1940)
and Malott et al (1948, Fig. 2)

Figure 5

not the Waltersburg. Farther west and south the Waltersburg is 60 feet above this thin limestone member of the Vienna. The Elwren sandstone is calcareous here but not typically so farther north. The Golconda and Glen Dean formations are better exposed in the ravines just north of the highway.

Proceed eastward on U. S. Hwy. 460 for 13.4 miles to road to Wyandotte Cave. Turn left (north) and proceed one-half mile to Wyandotte Lodge for Lunch Stop.

LUNCH STOP, Wyandotte Lodge at Wyandotte Cave. While time will not permit a detailed study of the stratigraphic section in the vicinity of Wyandotte a few notes are added here for those not otherwise acquainted with the locality. The entrance of Wyandotte Cavern is in the Paoli limestone at 575 feet above sea level and 180 feet above deeply entrenched Blue River. For the most part the cavern system is developed in the Ste. Genevieve limestone which is here about 175 feet thick. The lowest explored level is approximately 460 feet in altitude and 75 feet above Blue River. The main cavern routes are 100 to 110 feet below the entrance. The hill back of the hotel is capped with Hardinsburg sandstone and exceeds 840 feet in elevation. A fairly complete stratigraphic section consisting of Mississippian formations from the Ste. Genevieve to the Hardinsburg can be compiled from outcrops in road ditches, ravines, and exposures in the cavern itself.

Return to U. S. Hwy. 460. Check speedometer. Turn right (west) and proceed 1.7 miles over route traveled earlier to Stop 4.

STOP 4, Cole's Bridge Section (fig. 6). Unusual contact of the Paoli and Mooretown formations is one of the striking features of this section. Four and one-half feet below the lower shaly zone in the Paoli, and just below the floor of the small, abandoned quarry, is a brecciated limestone bed which represents the top bed of the Ste. Genevieve formation. The Rosiclare ^{Calcareous} sandstone member of the Ste. Genevieve is 45 feet below the brecciated limestone bed and may be seen a few hundred yards west of this point.

Proceed westward on U. S. Hwy. 460 for 6.7 miles.

SLOW DOWN. Massive, bluff-forming sandstone at the bridge near Turkey Fork is Sample sandstone. This point is less than 5 miles from the outcrop of shaly Sample visited on Stop 3.

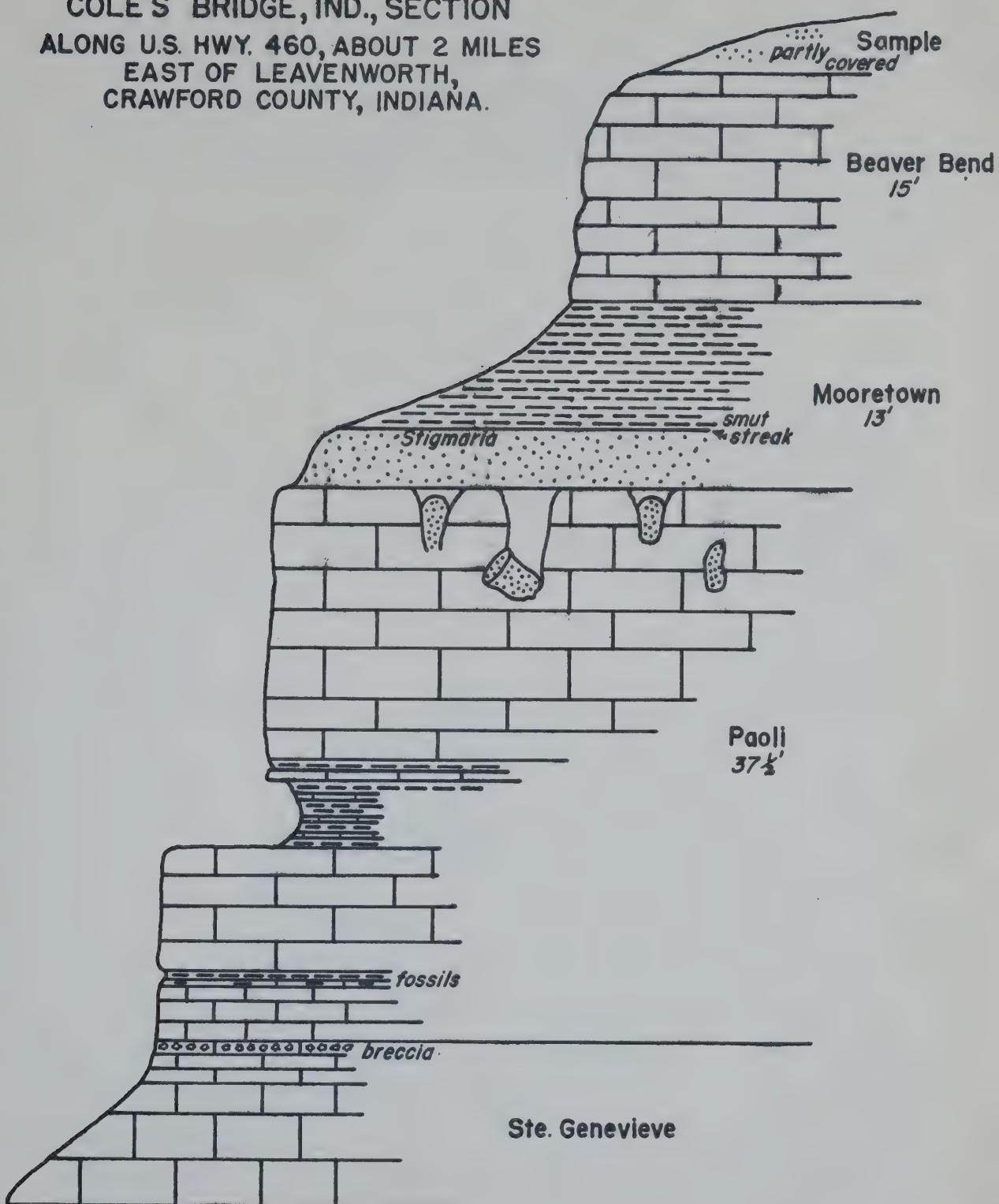
Proceed westward to St. Croix. Check speedometer at junction U. S. Hwy. 460 and Ind. Hwy. 37. Continue westward on U. S. Hwy. 460 for 0.3 mile.

SLOW DOWN. Contact of Mansfield sandstone and Menard shales. Immediately downhill from this contact is an outcrop of Waltersburg sandstone forming a small waterfall in the ravine on the north side of the highway.

Proceed westward to Stop 5 (4.1 miles west of St. Croix).

STOP 4

COLE'S BRIDGE, IND., SECTION
ALONG U.S. HWY. 460, ABOUT 2 MILES
EAST OF LEAVENWORTH,
CRAWFORD COUNTY, INDIANA.

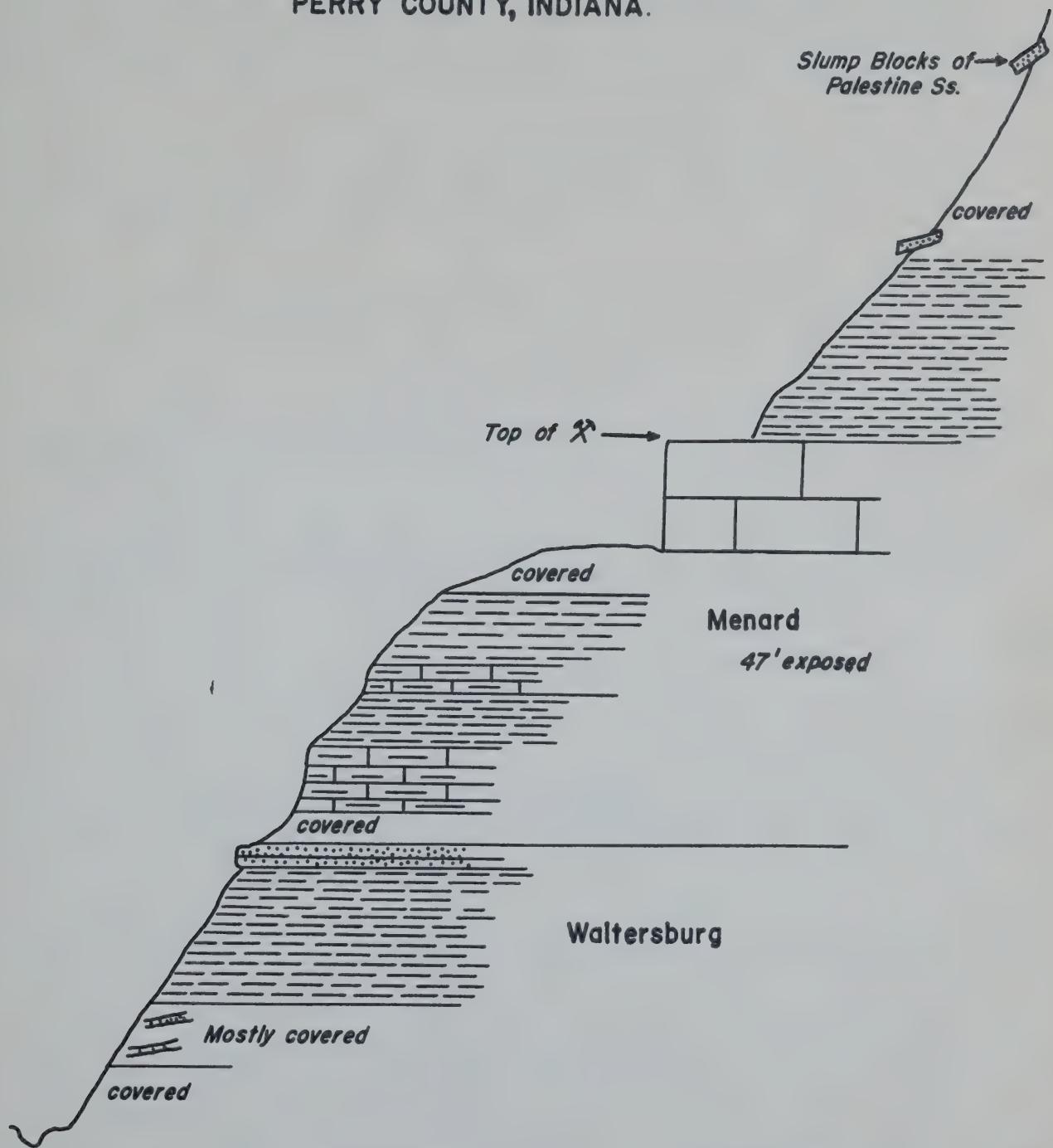


Adapted from Malott (Unpublished Field Notes)
McGrain (1947)

Figure 6

STOP 5

KUNKLER QUARRY SECTION
U.S. HWY. 460, 1.3 MILES W. OF UNIONTOWN P.O.,
PERRY COUNTY, INDIANA.



P. M. 1952

Figure 7

STOP 5, Kunkler Quarry Section (fig. 7). Menard limestone and shale are especially well exposed at the quarry and in nearby ravines. Good exposures of this formation are rare because of weathering, slump, and so forth. This section is near the type locality of Malott's (1925, p. 109-110) Siberia limestone which has been correlated with the Menard limestone. The Waltersburg sandstone is not as well developed here as it is farther east and north.

This is the last official stop of the day. A suggested route for returning to Owensboro follows.

Proceed westward on U. S. Hwy. 460. Low bluffs of Palestine sandstone are present a short distance above the valley flats. Near Adyville (approximately 4.5 miles west of Stop 5) the Mississippian formations go below drainage level. At this point the Mansfield rests upon the Palestine.

Continue westward on U. S. 460 through St. Meinrad to Dale (20.7 miles west of Stop 5). At St. Meinrad many of the buildings are constructed of Mansfield sandstone which has been quarried locally.

Turn left (south) at stop light at Dale and proceed southward on U. S. Hwy. 460 and Ind. Hwy. 45 for 8.7 miles to point where Ind. Hwy. 45 leaves U. S. Hwy. 460.

Turn left (east) on Ind. Hwy. 45 and proceed east and then south for 11.9 miles to junction with Ind. Hwy. 66 near Rockport.

Turn right (west) on Ind. Hwy. 66 and proceed through Rockport to junction with Ind. Hwy. 75. Turn left (south) on Ind. Hwy. 75 and proceed to Owensboro. This latter part of the route is the same as was covered earlier.

Saturday, April 26, 1952

Leave Owensboro at 8:00 a.m. (Central Standard Time). Proceed eastward on U. S. Hwy. 60 through Lewisport to Hawesville. Check speedometer at stop light at foot of hill at Hawesville and proceed eastward on U. S. Hwy. 60 for 3.3 miles.

SLOW DOWN. Outcrop of massive, cross-bedded Caseyville sandstone at Indian Lake.

Proceed on U. S. Hwy. 60 for 5.8 miles east of Hawesville. **SLOW DOWN.** Tar Springs sandstone bluffs on either side of the road.

Proceed eastward. **SLOW DOWN** 8.0 miles from Hawesville. Type locality of Buffalo Wall formation. This name was proposed by Butts (1917, pp. 112-113)

for Mississippian strata above the Tar Springs sandstone because he thought that the natural subdivisions as had been recognized in Illinois and western Kentucky did not exist in Breckinridge County.

Continue eastward on U. S. Hwy. 60 to Cloverport. Check speedometer at second traffic signal (east end of town). Proceed eastward on U. S. Hwy. 60 for 3.5 miles to junction with Ky. Hwy. 64. Check speedometer.

Turn left (north) on Ky. Hwy. 64 and proceed north and east for 10.6 miles to the east edge of Stephensport and Stop 6.

STOP 6, Stephensport Section (fig. 8). Section begins in ravine on south side of road and continues through a series of road cuts up the hill for about three-fourths of a mile. The Glen Dean is not exposed along the road but is well exposed and developed in the river bluff immediately north of the highway. Plio-Pleistocene gravels are present on the bench formed by the Hardinsburg sandstone and on top of the hill. In a road cut approximately 0.5 mile east of the Tar Springs outcrop rather striking slump is displayed in Buffalo Wallow shales.

Proceed eastward on Ky. Hwy. 64 for 3.4 miles to Ky. Hwy. 259. Check speedometer. Turn right (south) on Ky. Hwy. 259 for 1.3 miles.

SLOW DOWN. Abandoned quarry on right (west) side of road is in the Golconda limestone.

Proceed southward on Ky. Hwy. 64 to Sample station. (2.4 miles south of junction of Ky. Hwys. 64 and 259.) SLOW DOWN. Type section of Sample sandstone is along the railroad east of the village. Check speedometer. Mooretown sandstone and Beaver Bend limestone are present on the east edge of the road 0.4 mile south of this point.

Proceed southeast on Ky. Hwy. 259 (7.7 miles from Sample station) to road cut at Hardins Creek and Stop 7.

STOP 7, Hardins Creek Section (fig. 9). The full thickness of the Beech Creek limestone is exposed in this section. Note the occurrence of the Productus inflatus, particularly in the upper few inches. The Elwren formation is calcareous here. Other good exposures of the formations displayed in this section are present in the road cut and ravines just north of this point.

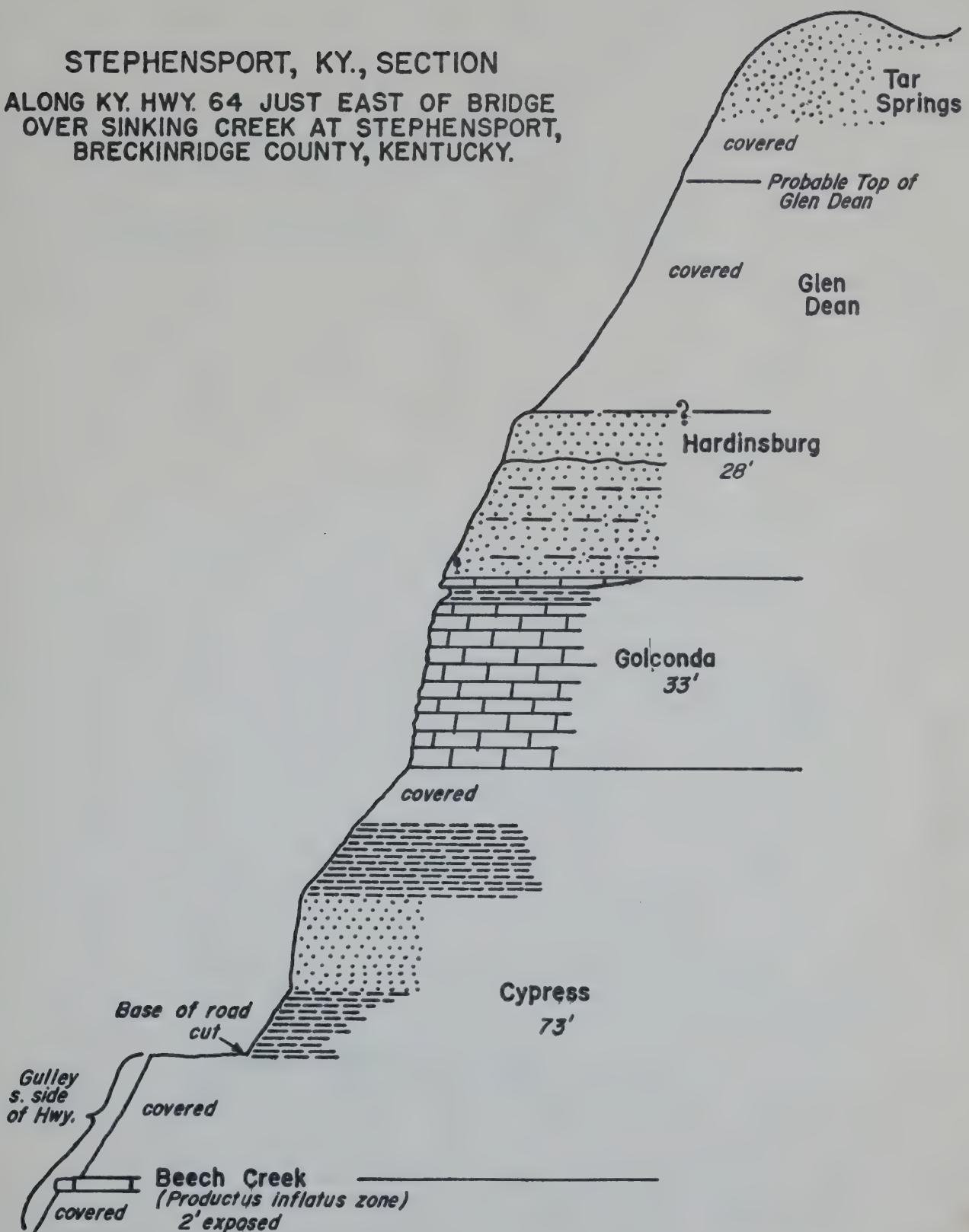
Proceed southeast on Ky. Hwy. 259 for 2.3 miles. SLOW DOWN. Typical exposure of Hardinsburg sandstone near type locality.

Proceed into Hardinsburg. Check speedometer at junction with U. S. Hwy. 60.

Continue through Hardinsburg and eastward on U. S. Hwy. 60 for 11.3 miles to gravel road near top of Sinking Creek Hill.

STOP 6

STEPHENSPORT, KY., SECTION
ALONG KY. HWY. 64 JUST EAST OF BRIDGE
OVER SINKING CREEK AT STEPHENSPORT,
BRECKINRIDGE COUNTY, KENTUCKY.

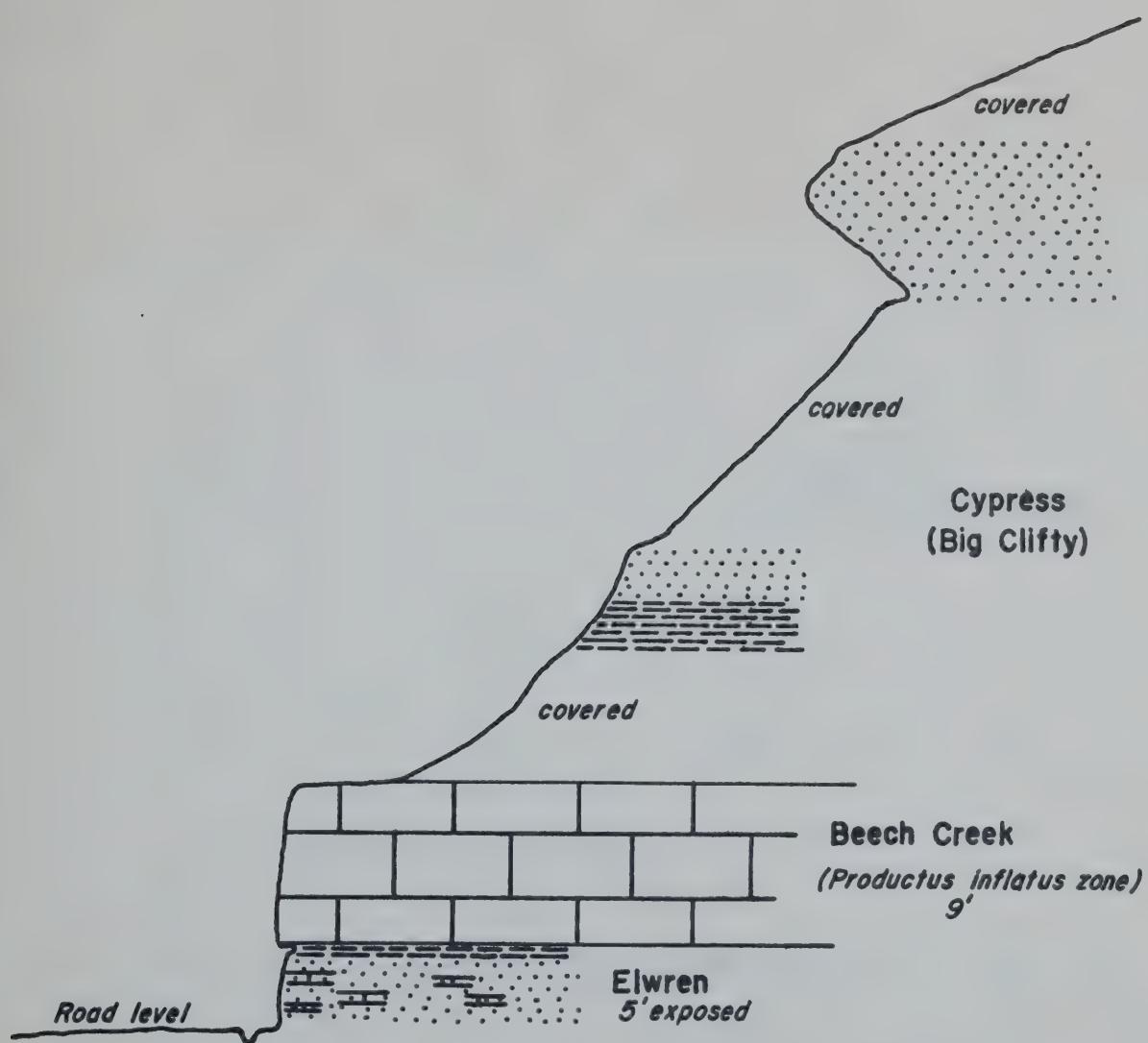


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Figure 8

STOP 7

HARDIN'S CREEK, KY., SECTION
ALONG KY. HWY. 259, 2.8 MILES NORTH OF
HARDINSBURG, BRECKINRIDGE COUNTY, KENTUCKY.

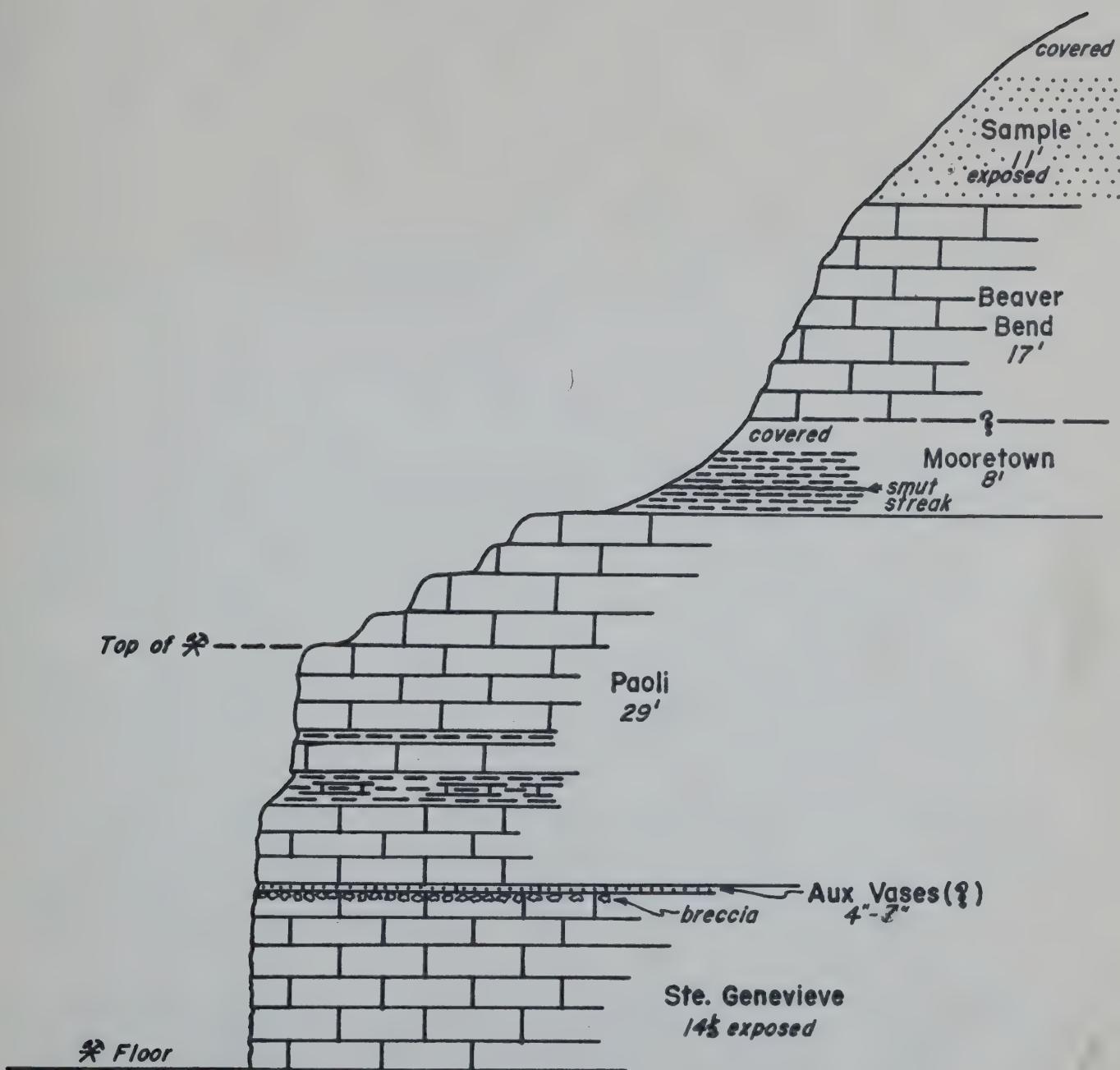


P.M. and F.H.W. 1952

Figure 9

STOP 8

ROSS QUARRY SECTION
SINKING CREEK HILL, NEAR U.S. HWY. 60,
5.2 MILES NORTHEAST OF GARFIELD,
BRECKINRIDGE COUNTY, KENTUCKY



P.M. and F.H.W. 1952

Figure 10

Turn right off U. S. Hwy. 60 and proceed 0.5 mile to Ross Quarry and Stop 8.

STOP 8, Ross Quarry Section, Sinking Creek Hill (fig. 10). Section starts in the abandoned quarry and continues along the gravel road between the quarry and U. S. Hwy. 60. This section is near Stouder's (1938, p. 274) Sinking Creek Hill Section, which was measured along what is now an abandoned railroad grade a short distance to the west. Although not shown on the accompanying stratigraphic section, other Chester formations up to the Cypress (Big Clifty) may be viewed along the road between this point and U. S. Hwy. 60. The Reelsville is poorly exposed here but its thickness may be ascertained along the abandoned railroad. Elwren shales, the Beech Creek limestone with Productus inflatus, and Cypress (Big Clifty) sandstones and shales are exposed in the ditches on the east side of the gravel road just below the top of the hill.

This is the last stop on the itinerary and concludes the field excursion.

DESCRIPTIONS OF FORMATIONS

Brief, generalized descriptions of the formations viewed in the field together with important fossils are listed below. Since the descriptions are generalized they do not necessarily describe all outcrops. Much of this summary has been adapted from the guide book of the Second Annual Indiana Geological Field Conference (Malott, et al, 1948, pp. 22-25).

Mississippian

Ste. Genevieve limestone: Meramec. Type locality at Ste. Genevieve, Ste. Genevieve County, Mo. Named by Shumard in 1860. Thick to thin, even- to cross-bedded, lithographic to crystalline and oolitic, white to medium-gray limestone, containing scattered chert. Divided into Fredonia limestone, Rosiclare calcareous sandstone, and Levias limestone which is topped by a thin zone of brecciated limestone. Index fossil: Platycrinus penicillus.

Aux Vases sandstone: Lower Chester. Type locality along Aux Vases River, Ste. Genevieve County, Mo. Named by Keys in 1892. Thin, calcareous sandstone or green shale. Often absent entirely within the area covered by this trip.

Paoli limestone: Lower Chester. Type locality at Paoli, Orange County, Ind. Named by Elrod in 1899. Compact, oolitic limestone, dark-gray to nearly white. One or two shale "breaks", which frequently contain many Chester fossils, are common in this area. Index fossils: Talarocrinus, Spirifer leidei, and Composita trinucula.

Mooretown sandstone: Lower Chester. Type locality at Mooretown, Lawrence County, Ind. Named by Cumings in 1922. Sandstone, shale, or both. One or two thin coal beds or smut streaks are common in the shale. Casts of Lepidodendron and Stigmaria carbonica occur in top of sandstone below the coal horizon.

Beaver Bend limestone: Lower Chester. Type locality at big bend of Beaver Creek near Huron, Lawrence County, Ind. Named by Malott in 1919. White, oolitic limestone. Often massive and conspicuously jointed. Productus elegans and Talarocrinus.

Sample sandstone: Lower Chester. Type locality at Sample station, Breckinridge County, Ky. Named by Butts in 1918. Sandstone, shale, sandy shale, or combinations thereof.

Reelsville limestone: Lower Chester. Type locality at Reelsville, Putnam County, Ind. Named by Malott in 1919. In most of Indiana it is a thin, compact, blocky, oolitic to sub-oolitic limestone containing considerable pyrite which causes a characteristic red color in weathered outcrop. In extreme southwestern Harrison County, Indiana, and on southward into Kentucky it becomes much thicker and loses its Indiana lithologic characteristics except for the occurrence of oolites. Pentremites, Productus, Talarocrinus, and Agassizocrinus have been reported.

Elwren sandstone: Lower Chester. Type locality at Elwren station, Monroe County, Ind. Named by Malott in 1919. Sandstone, shale, and arenaceous limestone.

Beech Creek limestone: Lower Chester. Type locality at Ray's Cave on Beech Creek, eastern Greene County, Ind. Distinctive, hard, gray, semi-crystalline limestone. Most conspicuous and persistent spring zone in the Chester occurs at the base of this formation. Beech Creek limestone is equivalent to the Productus inflatus zone of Butts (1917, pp. 87-90) and Stouder (1938, pp. 276-277). The "type locality" of the "Barlow lime," which has been correlated with this formation, is a well on the Barlow farm in the Pellville field, southwestern Hancock County, Ky. Fossils include Productus inflatus and Martinia contracta. A large, unidentified crinoid stem characterizes this formation in Indiana but its stratigraphic range in Kentucky is much greater.

Cypress sandstone: Middle Chester. Type locality at Cypress Creek, Union County, Ill. Named by Engelmann in 1868. Sandstone and shale. Sandstone characteristically laminated but rarely cross-bedded. Forms cliffs. The Big Clifty sandstone, named by Norwood in 1876, for sandstone exposures on Big Clifty Creek in Grayson County, Kentucky, was correlated with the Cypress by Butts (1917, pp. 86-90).

Golconda limestone: Middle Chester. Type locality at Golconda, Pope County, Ill. Named by Brokaw in 1916. Coarse, crinoidal limestone with thin shale beds. Contains white, tabular chert in area covered by this excursion. Fossils include Archimedes, Pentremites, and Pterotocrinus.

Hardinsburg sandstone: Middle Chester. Type locality at Hardinsburg, Breckinridge County, Ky. Named by Brokaw in 1916. Flaggy to massive sandstone and red, gray and green shale.

Glen Dean limestone: Middle Chester. Type locality at Glen Dean, southern Breckinridge County, Ky. Named by Butts in 1917. Massive, whitish- to

bluish-gray, oolitic to crystalline limestone. Becomes shaly at top. Pentremites spicatus and Prismopora serrulata are typical fossils.

Tar Springs sandstone: Upper Chester. Type locality at Tar Springs, Breckinridge County, Ky. Named by Owen in 1856. Characteristically a massive, cross-bedded sandstone, occasionally contains much shale.

Vienna limestone: Upper Chester. Type locality at Vienna, Johnson County, Ill. Named by Weller in 1920. Consists of shale, thin limestones, and thin sandy beds.

Waltersburg sandstone: Upper Chester. Type locality at Waltersburg, Pope County, Ill. Named by Weller in 1920. Thin, hard sandstone which frequently forms small waterfalls. Not readily recognizable in southern two-thirds of Perry County, Ind., but comes in again in western Breckinridge County, Ky.

Menard limestone: Upper Chester. Type locality at Menard, Randolph County, Ill. Named by Weller in 1913. Interval between Waltersburg and Palestine sandstone consists of limestone, shale, and shaly limestone. Usually one conspicuous limestone bed is present in this interval.

Palestine sandstone: Upper Chester. Type locality at Palestine Township, Randolph County, Ill. Named by Weller in 1913. Hard, fine-grained sandstone, often quartzitic. Forms benches and small waterfalls.

Clore limestone: Upper Chester. Type locality at Clore school, Randolph County, Ill. Named by Weller in 1913. Interval between Palestine and Degonia sandstones consists mostly of shale with thin, yellow, impure limestones. Contains Bastotomella nitidula and Composita subquadrata.

Degonia sandstone: Upper Chester. Type locality at Degonia Township, Randolph County, Ill. Named by Weller in 1920. Hard, fine-grained sandstone, often quartzitic, and forms small waterfalls.

Kinkaid limestone: Upper Chester. Type locality at Kinkaid Creek, Jackson County, Ill. Named by Weller in 1920. Limestone and shale. Limestone typically displays undulating bedding planes on weathered surface. Formation frequently cut out by Pennsylvanian. Fossils include Spirifer increbescens and an undescribed Chaetetes.

Pennsylvanian

Mansfield sandstone: Pottsville. Type locality at Mansfield, Parke County, Ind. Named by Hopkins in 1896. Coarse-grained, sometimes pebbly, cross-bedded, massive sandstone. Contains thin coals and shale zones. In area of field excursion it rests unconformably on various Upper Chester formations. In western Kentucky and southeastern Illinois the name Caseyville has been applied to this formation. Caseyville was named by Owen in 1856 (redefined by Glenn in 1912) for outcrops at Caseyville, Union County, Kentucky.

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